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Results of LMSC Ballot D5.0 - Lost comments
Including actions taken by the editors and proposed actions from Bob O'Hara, Dave Bagby and Vic Hayes
subject to 802.11 discussion and approval by the sponsor ballot resolution meeting

43	**10.1**	**RS**	**t**	**Y**	Since the operation of the MAC depends on MAC Management being present, and MAC Management requires a SM entity, the statement that "a SM entity is assumed to exist" should be replaced by a "shall" requirement.	Add a requirement that a SM entity be present, either here or in Clause 11.	
44	**11.1.2.1**	**RS**	**t**	**Y**	The note states that Beacons may be delayed. In fact, since CSMA delay is unbounded (especially without fixing the Capture Effect!) Beacons may not be sent at all.	The standard needs to deal with the possibility that frames, including Beacons and ATIMs, etc. may be delayed indefinitely. The standard must specify the behavior of the STAs under these conditions.	
45	**11.2.1.1**	**RS**	**T**	**Y**	The draft states that "Some circuitry, such as timers, may still be active.".	The standard must state, explicitly, exactly which functions of the MAC and MAC Management must remain active during doze state for proper operation.	
46	**11.2.2.1**	**RS**	**T**	**Y**	The mechanism specified for operation of power-save mode in an IBSS does not appear to ensure correct operation, since the time for successful transmission of a ATIM (using CSMA/CA) is unbounded. Worse than this, the use of power-save effectively forces all traffic into the ATIM window (until the devices actually come out of doze state). This further reduces the available bandwidth and increases contention during the window, increasing the probability that the ATIMs will not be delivered. This appears to fail in the worst-case of all stations dozing under heavy load.	Eliminate the use of power-save mode in ad-hoc networks.	

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					There is no assurance that any station will ever be able to transmit ATIMs (much less data frames) under worst-case conditions.		
47	**11.2.2.4**	**RS**	**t**	**Y**	There are two conflicting statements in the first paragraph. The first sentence requires ("shall") STAs to buffer MSDUs for stations known to be in power-save mode. Yet the second sentence says that that knowledge is outside the scope of the standard. How can you have a conformance requirement that is outside the scope of the standard?	Eliminate the use if power-save mode in ad-hoc networks.	
7	**5.2.3, 5.2.4.1, etc.**	**RS**	**E**	**Y**	The use of rhetorical questions, such as in the paragraph just before Figure 5 is inappropriate in an IEEE standard. (global issue)	Eliminate this and all such rhetorical questions.	Proposed action: Request declined. The group feels that the 802.11 document must do more than simply write up the final results of the group's work. In particular, it is useful to set the context of the architecture within which 802.11 exists - to this end the text referred to is helpful to other readers / reviewers.
9	**5.2.4.1**	**RS**	**E**	**Y**	The statement, "Bridges were originally designed to provide range extension between like-type MAC layers." is false. Bridges were first designed to provide traffic segmentation between LANs, regardless of MAC type. Refer to the 802.1D introduction. In the next paragraph, there is a reference to "bridge-like devices", with no definition of what these are. IEEE 802 only defines bridges, not "bridge-like devices".	Eliminate these statements.	Proposed action: Partially accepted. The reference to "bridge-like devices" remains as 802.11 recognizes that 802.11 links will operate in environments that are not restricted to 802 specified components.
2	**5.3.3**	**RS**	**T**	**Y**	The last paragraph of this section implies that an IP internetwork may be used as the DS for an 802.11	Either: (1) Eliminate the discussion of IP internetworks appearing	Proposed action: Declined.

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					ESS. This places a Network Layer entity as a "service provider" to a MAC entity, in contradiction with both the letter and spirit of ISO 7498.	"below" the 802.11 MAC, or (2) Eliminate the DS and ESS concepts from 802.11 entirely.	One of 802.11's primary purposes is to handle mobility within the constraints imposed by existing LAN systems - hence the DS and ESS concepts in 802.11. It is not required that a DS be entirely layer 2 entities. Neither is it required that DSs NOT be layer 2. There exist implementations of the 802.11 architectural concepts of DS which are not restricted to layer 2. An example would be the coupling of 802.11 to a DS based on the IETF mobile IP specification. 802.11 chooses not to ignore the existence of non-802 LAN components.
1	**5.4.1.2**	**RS**	**T**	**Y**	There is no specification of the functions or even service requirements of the Integration Service. Without any specification, there is no way to ensure correctness, conformance, or interoperability of any Integration Service implementation. Without these three elements, the service is meaningless and useless.	Specify (at a minimum) sufficient detail of the requirements of an Integration Service implementation to ensure correctness, conformance, and interoperability, or alternatively, eliminate the Integration Service from 802.11.	Proposed action: No change needed. The details of the integration service are dependent on the implementation of a specific DS. As the service in question is an interface to the DS, it is not appropriate for 802.11 to attempt to specify it. It is appropriate for 802.11 to mention the functionality as part of setting the architectural context for 802.11 operation.
12	**5.4.3.1**	**RS**	**E**	**Y**	It is not true that, in a wired LAN, access conveys authority, as stated. Authority is dealt with as	Eliminate this statement.	Proposed action: 802.11 disagrees.

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					mandated by the security needs of the organization administering the wired LAN.		In a typical wired LAN, physical access to a physical connection point does provide the ability to make the connection. The 802.11 authentication mechanisms provide a substitute for the physical security characteristics of wire which 802.11 does not inherently have due to the use of wireless PHYs.
13	**5.4.3.1, 5.7.6**	**RS**	**T**	**Y**	Since 802.11 does not mandate the use of any particular Authentication scheme, there is no way to ensure conformance or interoperability. This is a requirement of any standard.	Specify the Authentication scheme sufficiently to provide for conformance and interoperability, or eliminate Authentication from 802.11.	Proposed action: Declined. The comment is incorrect. While 802.11 does not specify a **single** specific authentication scheme, it does specify 2 authentication schemes and could be extended to others. The ones specified are sufficiently detailed to ensure conformance and interoperability.
14	**5.4.3.2**	**RS**	**e**		The act of Deauthentication causes an IMPLICIT Disassociation, not an EXPLICIT one.	Change the wording as indicated.	Changed.
15	**5.4.3.3**	**RS**	**E**	**Y**	The term "adapter" in the second paragraph is undefined.	Define "adapter", or change wording to eliminate the term.	Changed.
16	**5.4.3.3, 8.1.2, 8.2.1**	**RS**	**T**	**Y**	802.11 defines a WEP algorithm for privacy. There is already an established 802 standard for secure data exchange (802.10 / SILS). There is no need to define new standards where we have existing ones. In addition, a privacy algorithm that requires a known key must specify a means for key distribution, or it is not usable in an interoperable	Eliminate the WEP algorithm and use 802.10 for secure data exchange, along with the 802.10 key distribution mechanisms.	Proposed action: Declined. The purposes of 802.10 and the 802.11 WEP are not the same. WEPs purpose is to compensate for the physical attributes of wired media

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					manner. There is already a standard for key distribution in 802.10, which should be used by 802.11.		which wireless media do not have. The group feels that this is a requirement for commercial success and that it is not commercially acceptable to require a full 802.10 implementation for every 802.11 implementation. WEP is applied only to the 802.11 link and provides a substitute for missing "closed physical nature of wire". The subject of key distribution and the use of keys are separate subjects. Many security systems assume a separate conceptual communication channel over which key values have been provided. 802.11 will inter-operate with out having to povide the details of key management as part of the MAC layer..
18	**5.5, etc.**	**RS**	**T**	**Y**	There are many places in this clause (and others) where what are essentially MAC and MAC management specifications are buried in the service descriptions. These have associated "shall" statements, which require PICS entries. (For example, on p. 24, bottom: "If STA A receives a class 2 frame . . .") All conformance requirements should be in the same section (MAC and / or MAC management) and not strewn through service descriptions and other clauses. All "shall" statements shall be grouped and easy to find and recognize (sic!).	Put all conformance requirement statements in the clause appropriate to that requirement. There should be no "conformance" requirements in a clause on service specifications, since these are not required to be exposed interfaces.	Proposed action: The reviewer apparently would like the document to have a different structure. However, the group was unable to determine from the comment supplied, what structure would satisfy the reviewer. Therefore the request is declined.

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19	**5.6**	**RS**	**t**	**Y**	There is no need to require a device in an IBSS to be able to associate.	Eliminate the requirement.	Proposed action: No change needed. Clause 5.6 does not contain any reference to association, hence it already reads as the reviewer desired.
20	**5.6**	**RS**	**E**	**Y**	In Fig 10, it is not obvious that a STA *may* be an 802.1D bridge, or a router. Both of these devices appears as regular STAs to 802.11.	Add a note to Figure 10: One or more STAs may be providing 802.1D bridging or Network Layer routing functionality, even in an IBSS.	Proposed action: Declined. Please refer to the definition of Station in clause 3. A Station is not defined as the physical box within which there may be components in addition to an 802.11 implementation. Specifically, the Station in figure 10 are ONLY Stations, there are no Bridges or routers possible in an IBSS as neither bridges or routers can be a member of the IBSS. If an 802.11 Station happens to be contained within a physical box, which does further processing on data acquired via the 802.11 Station, what that processing is is not relevant - this hypothetical box may be doing something similar to a bridge, or it may be doing word processing.
21	**5.7**	**RS**	**e**		The meaning of "minimally present" in the first paragraph is unclear.	Reword.	Sentence removed.
22	**5.7.7**	**RS**	**e**		A station may be authenticated with an AP *or* another STA (in an IBSS).	Change wording to reflect.	Proposed action: Incorrect. Authentication is

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							always between two 802.11 Stations. APs and STAs are not XOR. An AP is defined to contain a STA. Please refer to Clause 3 definitions.
23	**6**	**RS**	**T**	**Y**	Ordering of MSDUs: ISO 15802 (the successor document to ISO 10039) has been changed (in part due to my own actions taken on behalf of 802.11) so that the ordering invariant is no longer between MAC entities, but between DA/SA pairs. There is a subtle difference, since a single MAC entity will handle multiple DAs (in the case of multicast frames). The bottom line is that there is no longer a requirement to maintain the relative ordering of MAC frames between multicasts and unicasts. (Isn't this what you wanted me to do?) Ordering must still be maintained within a unicast stream, or a multicast stream (for a given multicast DA), but not between the streams. This greatly simplifies your design.	Eliminate the "strictly ordered" class of service, all discussions of ordering, and all references the "strictly ordered" class.	
24	**6.1.2, etc.**	**RS**	**E**	**Y**	The text discusses sublayers within the MAC (e.g., WEP), that are not present in Figure 11.	Update Figure 11 to reflect the sublayering in 802.11.	
25	**6.1.3**	**RS**	**T**	**Y**	This section states that the DS may reorder MSDUs (even within a unicast stream). This is unacceptable at the MAC service interface, and is a prime example of why (1) The DS, if allowed, must have its requirements specified, and (2) IP is unsuitable as a DS mechanism for an IEEE 802 MAC. This section essentially violates ISO 15802/10039, as it states that 802.11 does not guarantee even the unicast ordering invariant at the MAC service interface of a conformant implementation. If you are providing a IEEE MAC-layer service, you must specify whatever is necessary to provide such a service at the LLC interface. This section allows an	Either specify the DS in sufficient detail to ensure correctness, conformance, and interoperability, or eliminate the DS concept and all references to it in 802.11.	

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					802.11 conformant interface that violates IEEE 802 Functional Requirements.		
26	**6.2.1.1**	**RS**	**e**		The discussion of transmission rates and the switching algorithm is out-of-place in the clause on LLC service interface.	Eliminate this paragraph.	
29	**7.1.3.3.3, 7.2.2, etc.**	**RS**	**T**	**Y**	These clauses contain redundant "shall" statements. A "shall" requirement should only be stated once. This occurs in many other places within the standard; this is just one example.	Eliminate all redundant "shalls".	
30	**7.2.2**	**RS**	**T**	**Y**	There are numerous "shall" statements in this section on Frame Formats, e.g. " Data+DF-Ack, Data+CF-Ack+CF-Poll, CF-Poll, and CF- Ack+CF-Poll shall only be sent by a Point Coordinator". This is not a requirement of the *Frame Format*, but a requirement of the MAC entity. There should be no "shall" statements in the section on Frame Formats.	Move all conformance requirements ("shall" statements) from the Frame Format clause to the MAC or MAC Management clauses, or eliminate if redundant.	
35	**9.1.4, 9.2.6**	**RS**	**t**	**Y**	Because of the lack of fragmentation and the lack of acknowledgments, the Quality of Service provided by 802.11 on multicast frames is less than for unicast frames. This is unique to 802.11 among 802 MACs. This should be made explicitly clear in the LLC service specification.	Add a note to the LLC service specification clause indicating the lower QoS afforded multicast transmissions relative to unicast.	
36	**9.2.4**	**RS**	**t**	**Y**	It is critical not only that the distribution of random numbers be uniform, but also that they be statistically independent among STAs. Otherwise, you can get identical streams of "perfectly random" (low autocorrelation) numbers in each STA, yet still "collide" on every transmission.	Add a note indicating the need for statistical independence among the random number streams among STAs.	
37	**9.2.4**	**RS**	**t**		The use of "real" numbers is unnecessary (and difficult in some implementations). It is better to specify the Random function as providing a random *integer* in the range aCWmin through aCWmax slots.	Change as indicated.	
38	**9.2.4**	**RS**	**T**	**Y**	The backoff algorithm specified allows the value of	Change the backoff algorithm to a	

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					CW to be different in different STAs, depending on their relative success / failure on previous transmission attempts. This is precisely analogous to the similar "bug" in 802.3 / CSMA-CD, which causes the well-known "Capture Effect". The capture effect significantly reduces short-term fairness, and can cause significant performance degradation for certain high-layer protocols (e.g., NFS). Capture effect is well-documented in: Molle, Mart L., *A New Binary Logarithmic Arbitration Method for Ethernet*, Computer Systems Research Institute, University of Toronto, Technical Report CSRI-298, available by anonymous ftp: cs.toronto.edu / reports / csri / 298. 802.3 has a Task Force working on enhancements to the backoff algorithm, chaired by Dr. Molle. The new algorithm is commonly referred to as BLAM. BLAM eliminates the capture effect (and related problems) through simple means, which are directly applicable to 802.11. Capture is especially important in 802.11, since, with its relatively low data rate, the probability of a single device being able to saturate the network is quite high.	BLAM-like algorithm, to eliminate capture effect.	
39	**9.2.5.3**	**RS**	**t**	**Y**	The first sentence of the last paragraph implies that there must be an AP to use power-save mode.	Either reword or eliminate this statement to change the inference, or eliminate the use of power-save mode for ad-hoc LANs. (Note: A state-machine or other formalization of the MAC would eliminate this and many other inconsistencies.)	
33	**9**	**RS**	**T**	**Y**	802.11 specifies an extremely complex MAC in English prose. This is a deviation from all other 802 standards, and unacceptable for a number of reasons:	(1) Make the English prose description of the MAC (and MAC Management) *informative*, rather than normative. Remove all "shall"	802.11 decided to make a normative formal description using SDL, an ITU-T standardized language (Rec.

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					(1) This standard must be implemented by people unfamiliar with many of the slang terms used by the writers and left undefined, e.g., "transmit again immediately" (How soon is immediately?), or "shall be implemented on top of the DCF" (What does this mean for conformance?), or "shall wake-up" (undefined slang). (2) This standard must be implementable by non-native English speakers. Having the normative requirements in English prose makes this virtually impossible. (3) English prose (or any human language, for that matter) is ambiguous. There is not a 1:1 correspondence between *words* and *meaning*; the same words can mean different things depending on the listener's background. (This is a major reason why we have wars and courts of law; if language were unambiguous, we would have no arguments over the meaning of what was said!) (4) In particular, the 802.11 MAC is extremely complex, perhaps the most complex MAC yet devised within 802. No other 802 MAC standard allows the use of prose for normative specification.	statements from the descriptions. (2) Provide a normative, formalized presentation of the MAC (and MAC Management). This formalization can use state-machine notation, Pascal, C, Verilog or other code, or any method that is truly unambiguous.	Z100 series). Vic
4	**3**	**RS**	**e**		Definition of "Mobile Station"	Insert a <CR> before the definition.	Done
31	**7.3.2**	**RS**	**E**		The subclauses discussing each element type should be in the same order as the element IDs in Table 18, for readability and reference ease.	Re-order the subclauses as indicated.	Editor's job / decision? Vic
6	**5.2.3**	**RS**	**e**	**Y**	The text discusses "red blocks" in Figure 4, which is printed in black / white. I don't believe that IEEE will be publishing this document in color.	Eliminate Figure 4 and the associated references, as it is rather useless in black / white. Alternatively, print the standard in color (and distribute the drafts in that form as well).	New text refers to "dark box" which should show in black and white print
10	**5.3.1, 5.3.2**	**RS**	**e**			Change "The Station Services subset is:", to "The Station Services	Done

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						are:". Similar for Distribution Services.	
11	**5.4, 9.5, etc.**	**RS**	**e**		A forward reference is labeled as " xx.xx". (global issue)	Fix all such unresolved references.	Done
27	**6.2.1.3**	**RS**	**e**		The last paragraph is duplicated.	Eliminate one copy (take your pick!)	Done
34	**9.1.1**	**RS**	**e**	**Y**	The use of the term "contiguous frame sequences" is incorrect. Contiguous refers to adjacency in space. *Continuous* is the correct term for adjacency in time.	Use "continuous" in place of contiguous.	Done
41	**9.5**	**RS**	**E**	**Y**	Since the standard only requires the ability to reassemble 3 MSDUs simultaneously, a note is needed that the simultaneous presence of >3 fragmented MSDUs may result in excessive frame discards.	Add note as indicated.	Done
42	**9.8**	**RS**	**E**	**Y**	In the second paragraph, it is implied that MSDUs from different LLC sources (different LSAPs) might be reordered by the MAC. This is not true, as having different LSAPs does not change the MAC address, and ordering is based on address, not LSAP.	Delete the statement: "This latter restriction . . . "	Done
40	**9.4**	**RS**	**E**	**T**	The terms "size" and "length" are both used in this section with no implication that they mean the same thing. This is a good example of the ambiguity and sloppiness of English prose to specify algorithms. Also note that each takes a "shall": "The size of a fragment MPDU shall be an equal..." and "... its content and length shall remain fixed ...". Thus there are two separate conformance requirements on two separate entities (size and length).	Change terminology to be consistent. Use a formalization to specify the MAC to avoid having language ambiguities affect conformance and interoperability.	Done
3	**3**	**RS**	**e**	**Y**	In the definition of "Ad-hoc network", the word "comprised" should be "composed". This is a global editorial change (numerous other places). "The whole comprises its parts"; "The parts	Change all instances of "is comprised of" (or similar) to "is composed of".	Done

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					compose the whole". The expression "is comprised of" is never correct.		
17	**5.5**	**RS**	**T**	**Y**	The statement that an AP shall always be in State 3 seems incongruous. How does it get to State 3? With what does it get Authenticated and Associated? What is the initialization procedure? In what state is the AP while being initialized? If an AP is always assumed to be Authenticated and Associated, then there is no protection against "rogue" APs, as there is for "rogue" STAs.	The AP states should be defined in a state machine formulation, with State 3 being invoked after proper initialization and authentication (if necessary).	Has been corrected, see clause 5 resolution on comment number 36
8	**general**	**RS**	**E**	**Y**	There are no line numbers from which to reference comments.	Include line numbers in all future drafts, including recirculation ballots.	Next version will contain line numbers
5	**5.2.1.1**	**RS**	**e**		The title of this section is "STA to AP Association is Dynamic", yet the section does not discuss APs at all.	Change the title to reflect the actual content of the section.	Corrected - changed AP in title to BSS.
28	**7.2.1, 9.1.1, etc.**	**RS**	**T**	**Y**	The use of explicit RTS/CTS for LAN access control appears to be protected by one or more patents issued to Apple Computer. Has Apple agreed to abide by IEEE requirements for standardizing patented technology?	Either (1) Obtain the necessary letter from Apple ensuring patent licences on IEEE terms, or (2) Eliminate the use of RTS/CTS as an access control method from the standard, or (3) Obtain an opinion from IEEE counsel on the applicability (or lack) of the Apple patents.	Thanks for bringing this to our attention. Apple submitted the required statement. PatCom approved the statement
32	**8.2.2**	**RS**	**T**	**Y**	The WEP does not ensure international usability. This may be acceptable in an IEEE (US-only) standard, but is unacceptable for ISO (and may be unacceptable per IEEE policy as well, even if not in violation of any export laws).	Either: (1) Eliminate the use of WEP from 802.11, or (2) Specify a WEP algorithm that is acceptable for international use, or (3) Place a note in the standard indicating that the sections on WEP do not apply to the ISO version of the document (should this standard proceed to ISO, anything	Proposed action: The WEP has been carefully selected to be subject of receiving export licenses. The IEEE rules regarding use of IP in WEP were carefully followed. The Author of the comment asserts that WEP is not acceptable for international

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						disallowing internationalization will have to be dropped). In any case, check with the IEEE standards board regarding policy on standardization of technologies that cannot be exported from the US.	use, but does not explain why this is asserted. 802.11 disagrees with the assertion and believes to the best of it's knowledge that WEP is acceptable internationally.